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(54) Title: PROCESS FOR PRODUCING A FLUSHABLE, CLUMPABLE, DUSTLESS SEPIOLITE CAT LITTER

(57) Abstract: The present invention is related to a process for producing Flushable Clumping Dustless Sepiolite Clay Mineral Cat-litter Granules for pets, mostly for cats with some additional advantages over existing products on the market. The said granule composition is out of Sepiolite Clay powder and fine granules bonded by Bentonite slurry. Resulting Cat-litter clumps will immediately dissolve in water and it is easy to dispose them to sinks and toilets without any risk of clogging the drainage system of the house.

PROCESS FOR PRODUCING A FLUSHABLE,CLUMPABLE,DUSTLESS SEPIOLITE CAT LITTER

Technical Field

The present invention is related to a process for producing Flushable Clumping Dustless Sepiolite Clay Mineral Cat-litter Granules for pets, mostly for cats with some additional advantages over existing products on the market.

Background Art

To keep animal pets in houses is an extremely wide spread practice in the World. Cat-litter Granules are used in houses for cats to urinate over it. Granules are made of absorbent minerals and materials, they absorb urine and it's unpleasant odor to keep the house and air clean and fresh.

At present there are basically two kind of Cat-litter Granules dominate the market among many others, namely one being based on Sepiolite and the other based on Bentonite Clay Minerals.

Sepiolite, is highly absorbent clay mineral having color white to beige and crushed in to standard 1-5 mm. granules form, it is the major product for the last some 40-50 years on the market. Almost over one million mtons of Sepiolite Granule sold and almost all have been produced by Spain from it's rich Sepiolite Mineral Mines. It is a very well known product all over the world. Turkey in past several years appeared to be the second country on the world with her recently discovered rich Sepiolite mineral reserves.

Bentonite is also highly absorbent clay mineral having mostly light green and light brown in color and it is easily found quite abundant mineral in the world. Bentonite is crushed into two category granule sizes, such as 1-5 mm. particle sized standard product and 0,5-1 mm Micro Compact granule product. It is also a relatively new products on the market with some 10 years of past compared to Sepiolite Clay Granules.

In practice Sepiolite granules are laid in a Cat-litter tray of approximately 25x35 cm. in dimensions with 5-6 cm. granule bed thickness and said tray put at a suitable corner of the room, for the Cat to urinate on it. The tray kept several days in the room with same granules and then all granules are disposed according to Owner's practice. Then the tray again filled with fresh granules for further use. Sepiolite Cat-litter Granules are the favorite choice of pet owners due to their reputation formed in it's long past.

Bentonite, Standard and Micro Compact Granule products both although relatively new, due to their some advantages over Sepiolite Granules, they rapidly increase their share on the market.

When a cat urinate either on Standard or Micro Compact Bentonite granules, wetted granules immediately agglomerate and form a ball leaving the rest dry in the Cat-litter tray. Then this ball of granules can easily be taken out with a fork and disposed. Accordingly, rest of the granules in the tray and also the environment is kept dry, clean and fresh. Then required amount of new granules are added back to tray to keep the granule bed in shape and in level.

In addition to aforesaid advantages of Bentonite based granules, producers report that, for 0,5-1mm Micro Compact Bentonite Granule is more cost effective. 5 kg. Micro Compact Granule will last as long as 20 kg. of Standard Sepiolite granules.

But the big problem with Bentonite Granules are that, when they are wetted, they never dissolve in water and they stay as a humid lot of Bentonite Clay for a long time where ever they adhere. One never, even with an accident, should drop the clump in to toilets, sinks and lavatories of the house, clumps easily clog the drainage system and create insoluble problems. Consequently, to prevent the drop of the Bentonite Clumps in to drainage system through sink or toilets, imploring Attention Labels had to be printed by producers on the hard-board boxes of the merchandise.

On the other hand Standard Sepiolite based product contain dust in their packages which makes pet owners uncomfortable during usage.

US Patent No. 5,129,365 discloses an animal dross absorbent and a method of its production. The said absorbent is a non-compacted water swellable Bentonite clay that effectively absorbs animal dross and simultaneously agglomerates into a sufficiently large and stable mass, and mainly composed of both Sodium Bentonite and Calcium Bentonite for the agglomeration of urinated clay particles and ease of removal in that way.

US Patent No. 5,469,809 discloses a non dusting clumping animal litter comprising Sodium Bentonite, Calcium Lignosulfonate and binder and a process of creating thereof in order to produce a dust-free and flushable Cat-litter.

In order to avoid aforesaid drawbacks and problems there is a need for the production of a flushable, clumping, dustless Sepiolite Clay Mineral Cat-litter composition with relatively low cost and accordingly involving relatively simple steps of production.

Summary of The Invention

It is accordingly a primary object of the present invention is to provide a flushable, clumping, dustless Cat-litter granule composition out of Sepiolite Clay powder and fine granules bonded by Bentonite slurry.

It is further object of the invention is to provide a flushable, clumping, dustless Cat-litter having white color as in the good quality conventional Sepiolite Granules, and being efficient, usable and cost-effective as in the Bentonite Micro Compact granules.

It is still a further object of the invention is to provide a Cat-litter which clumps as in the Bentonite Clay Granules and easily taken out of Cat-litter tray by a fork.

Another major object of the invention is to provide that Cat-litter clumps will immediately dissolve in water and it is easy to dispose them to sinks and toilets without any risk of cloging the drainage system of the house.

Various of the foregoing objects and advantages are achieved in the Flushable Clumping Dustless Sepiolite Clay Mineral Cat-litter Granules according to the present invention.

Another advantage of the invention is, it's principal raw material is waste under-screen powder and fine granules produced while crushing Sepiolite lumps in to 1-5 mm. standard product. This Powder and under-screen fine granules amount up to % 25-30 of the processed Sepiolite mineral. This waste fine granules and powder is a low cost raw material for the new product and will make it more competitive on the market. If waste under-screen material is not available, crude Sepiolite Mineral lumps may be crushed down to 0-1 mm. particle sizes to be used as raw material.

The secondary minerals used in the process are Bentonite or louglinite (Sodium Sepiolite) or similar clay minerals with bonding properties.. Their functions are firstly to bind the Sepiolite particles with enough strength to keep them as solid granules in usage and secondly, when the product is wetted with urine, to agglomerate the granules to form the clumps to be separated out easily from the rest of dry particles in the tray. Proportions of each mineral in mixture are about 80% Sepiolite and 20% bonding clay.

The method of producing the Cat-litter granules of the invention comprise the following phases;

1- First phase is to prepare a dilute slurry of powder clay, such as Bentonite or Louglinite, and water in a high speed mixer. Clay mineral powder with propeller beatings of the mixer is dissolved down to sub-micron particle sizes in water.

2- Second phase is to mix the prepared slurry with Sepiolite powder and fine granules in prescribed proportions, in a suitable mixer such as the double screw mixer which is widely used in ceramic industry to produce ceramic mud.

3- At third phase, the mud is fed in to Screw Vacuum Extruder Press to be de-aerated to produce concrete and strong granules and to shape it into a cross-section by which it will be easily and completely dried by passing hot air down to required moisture level of the granules to be produced.

4-At fourth phase shaped dense mud mass is dried preferably in a Chain Conveyor Dryer.

5-At fifth phase dried Sepiolite blocks crushed by primary and secondary roll crushers and required product particle sizes are screened out, and the product is de-dusted during screening and then carried to product bin for packing and shipping.

There is also another alternative way of producing granules to be considered within the scope of the present invention such that;

At third phase, fed mud is de-aerated and screwed towards head of the Screw Vacuum Extruder Press, to which a mould with many perforated holes is connected. Squeezed mud in vacuum chamber is pressed through that perforated mould and macaroni-like many dense clay rods in desired diameter is being formed. A devise attached to head of the press cuts those rods down to desired length to form cylindrical shaped granules such as 4 mm. diameter x 4 mm. length or 3 mm. diameter x 3 mm. length. Then those granules are dried in a suitable dryer and sent to silos to stock.

Above described two different way of production methods produce two different kind of product in concern with their forms. First product is crushed type, looks like Standard Sepiolite Granules with different sized particles in the lot. Second product type is in shape of cylinder and all particles are same. They are two different merchandise, the second will be a completely new "Flushable, Clumping, Dustless Sepiolite Clay Mineral Cat-litter Granule" on the market.

Brief Description of the Figures

The method and composition of the invention now will be described below with reference to accompanying figures.

Figure 1 shows a block diagram of the process of the product granules similar to that of Standard Sepiolite Granules.

Figure 2 shows a block diagram of the process of the product with same sized unique cylindrical shaped granules.

The members and parts cited in the figures of the present invention are as follows;

1 high speed mixer
2 double-screw mixer
3 screw vacuum extruder press
4 chain conveyor dryer
5 primary roll crusher
6 secondary roll crusher
7 screen
8 de-dusting fan
9 dryer

Detailed Description of the Invention

Figure 1 is a block diagram illustration showing the general steps of the process according to the present invention. In the first step, the powder clays, such as Bentonite or louglinite, and a supply of water are fed into a high speed mixer (1) in order to prepare a dilute slurry of powder clay, inwhich clay mineral powder is dissolved down to sub-micron particle sizes in water by means of the propeller's beatings of the mixer. In the second step, prepared slurry is mixed with Sepiolite powder and fine granules in decided proportions in a second suitable mixer (2), such as the double screw mixer which is widely used in ceramic industry to produce ceramic mud.

In the third step is de-aeration of the resulting mud mass from the second step. The mud is fed in to a Screw Vacuum Extruder Press (3) to produce dense and stiff mud mass under vacuum and form it into a hollow column with a certain cross-section and cut to certain lengths as hollow blocks.

In the fourth step, shaped dense Sepiolite clay mass of blocks are dried down to required moisture level of the granules to be produced by passing hot air through hollow blocks, in a chain conveyor dryer (4). Finally at fifth step, dried Sepiolite blocks are crushed in a primary and secondary crushers (5-6), and then required product is screened out and de-dusted during screening (7-8), and carried to product bin for packing and shipping.

An Alternative method;

In an alternative embodiment of the process illustrated in Figure 2, in the third step, fed mud is de-aerated and screwed towards the head of the press under

vacuum (3) having a mould with many perforated holes. Squeezed mud is pressed through the said perforated mould and macaroni-like many dense clay rods with desired diameter is being formed. A device attached to the press head mould cuts those rods down to again desired length to form cylindrical shaped granules such as 4 mm. diameter x 4 mm. length or 3 mm. diameter x 3 mm. length. Then these granules are dried in a suitable dryer (9) and sent to silos to stock. Due to the lack of crushing operation, the said Cat-litter does not contain any dust.

Through embodiment and method of the invention which have been described in detail, it should be understood that numerous modifications may be made thereto without departure from the spirit and scope of the invention as set forth in the following claims.

CLAIMS

1. A process for producing Flushable, Clumping, Dustless Sepiolite clay mineral Cat-litter granules for cats, with the method comprising the steps of;

(1) supplying powder and fine granules of Sepiolite clay as major component of the product and Bentonite and Louglinite or other clays with bonding properties as a binding agent of the Sepiolite clay particles of granules,

(2) mixing the powdered Bentonite or Louglinite or other clays with water to obtain a fine dilute slurry having sub-micron sized clay particles in suspension,

(3) adding the clay slurry in to the mass of powder and fine granule of Sepiolite clay and mixing them together to be a hard mud in a special mixer, according to prescribed portions.

(4) de-aerating and pressing the mud in to a compact hollow column body to be cut into separate blocks with using screw vacuum extruder press.

(5) drying the de-aerated and compacted hollow blocks of Sepiolite clay.

(6) crushing and screening the dried, solid Sepiolite clay blocks in to granules and de-dust them.

whereby the resulting granules according to invention will clump well and easily dissolve in water without causing any cloging danger to drainage system of houses.

2. A process according to claim 1 wherein waste under-screen powder and fine granules or originally crushed Sepiolite clay will be used as major raw material for the production of new Sepiolite cat -litter.

3. A process according to claim 1, wherein the said dilute slurry will be prepared of Bentonite or Louglinite, that is Sodium Sepiolite, or other clays with bonding properties in water with a high speed mixer to mix and dissolve the clay into sub-micron sized particles.

4. A process according to claim 1 wherein said Sepiolite clay particles will be mixed with the slurry in a suitable mixer to produce a hard mass of mud.

5. A process according to claim 1 wherein said hard mass of mud will be de-aerated and compacted in a screw vacuum extruder press and squeezed through the head-mould of the press as a continuous column of designed hallow cross-section will be cut to desired lengths of separate blocks to improve the following drying process efficiency.

6. A process according to claim 1 wherein the said extruded hollow blocks of Sepiolite clay will be dried in a continues chain conveyor dryer.

7. A process according to claim 1 wherein the said dried hollow Sepiolite blocks will be crushed with special primary and secondary crushers and 1-5 mm. particle sized standard Sepiolite Cat-litter granules, will be screened out and de-dusted as the product.

8. An alternative process according to claim 5 to produce an entirely different type of granules, wherein de-aerated and compacted mass of Sepiolite mud in screw vacuum extruder press is squeezed out, this time through a perforated press head mould with many small holes of like 3,4,5 mm. to produce many macaroni-like dense and stiff clay rods.

9. A process according to claim 8, wherein a specially designed device will be mounted on the press head-mould to cut the Sepiolite clay rods to desired lengths and, with this process unique, dustless, like 3-4 mm. diameter x 3-4 mm. length dimensioned cylindrical granules will be produced as a new product.

10. A process according to claim 9, since macaroni-like rods are cut while the Sepiolite mud is wet there will be no dust produced and then the dried granules will be dustless.

11. Production of Flushable Clumping Dustless, Cylindrical Cat-litter granules according to the process set forth in preceding claims.

12. Cylindrical Cat-litter granules with desired dimensions according to claim 11 is produced containing Sepiolite clay powder and fine granules as major component and Bentonite or Louglinite, that is Sodium Sepiolite, or other clays mixed with water to form a slurry as bonding agent to bind Sepiolite particles, mixed together to form a hard mud which is being de-aerated and compacted in a screw vacuum extruder press, and extruded to form hallow blocks, then dried, crushed and screened to produce standard Sepiolite Cat-litter granules or with alternative process, the mud mass extruded in to form of macaroni rods and being cut down to certain lengths to produce granules which then is being dried to produce the new cylindrical shaped Sepiolite Cat-litter product.

13. Cat-litter granules according to Claim 12 or 13 wherein proportions of each mineral in mixture are approximately 80% Sepiolite and 20% bonding clay.

14. Cat-litter granules according to preceding claims wherein further comprising an additive selected from a group of deodorizer, scent and mixtures thereof.

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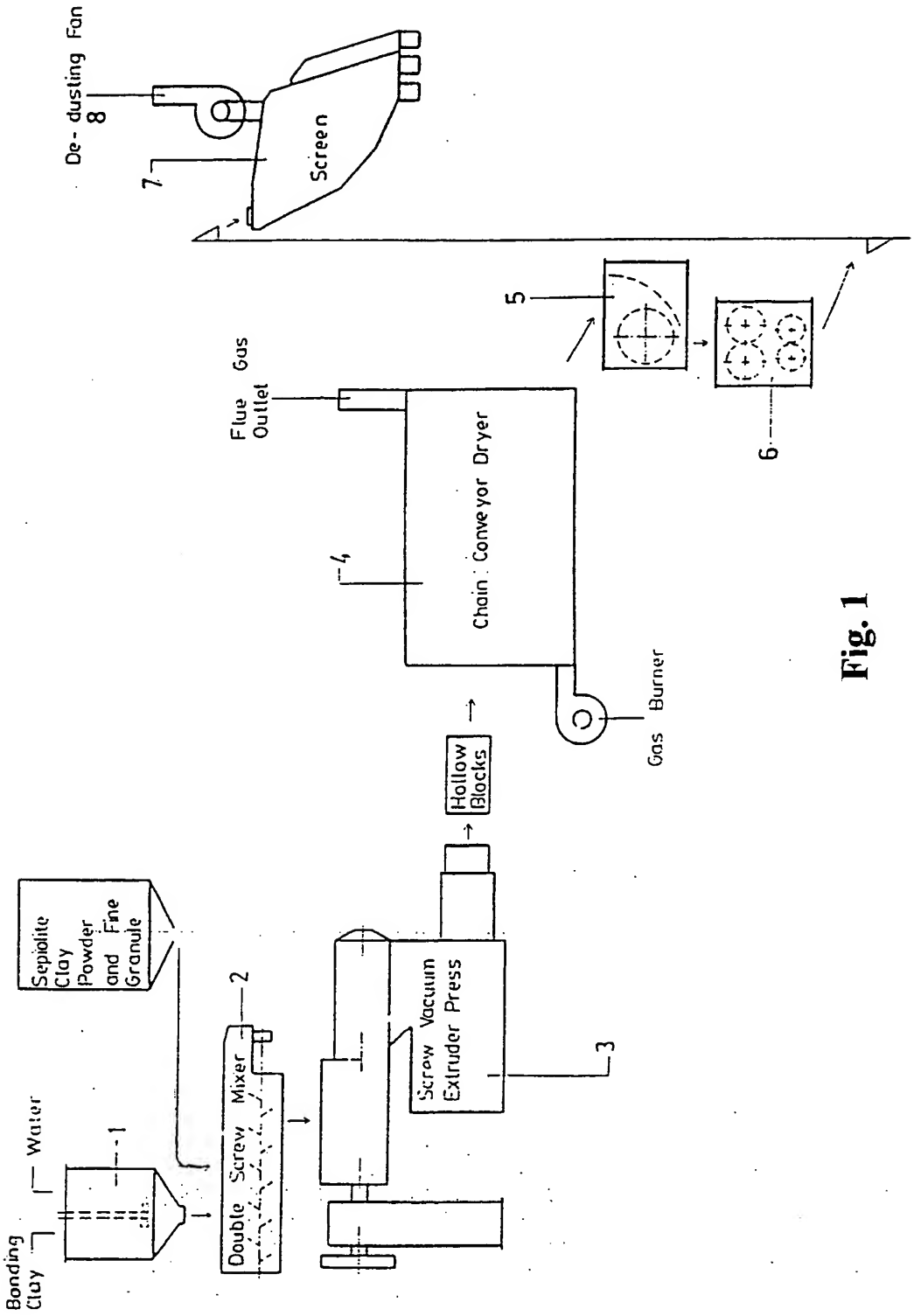
De- dusting Fan
8
Screen
7
5
6
Flue Gas Outlet
Chain Conveyor Dryer
4
Gas Burner
Hollow Blocks
Sepiolite Clay Powder and Fine Granule
Water
Bonding Clay
1
2
Double Screw Mixer
Screw Vacuum Extruder Press
3

Fig. 1

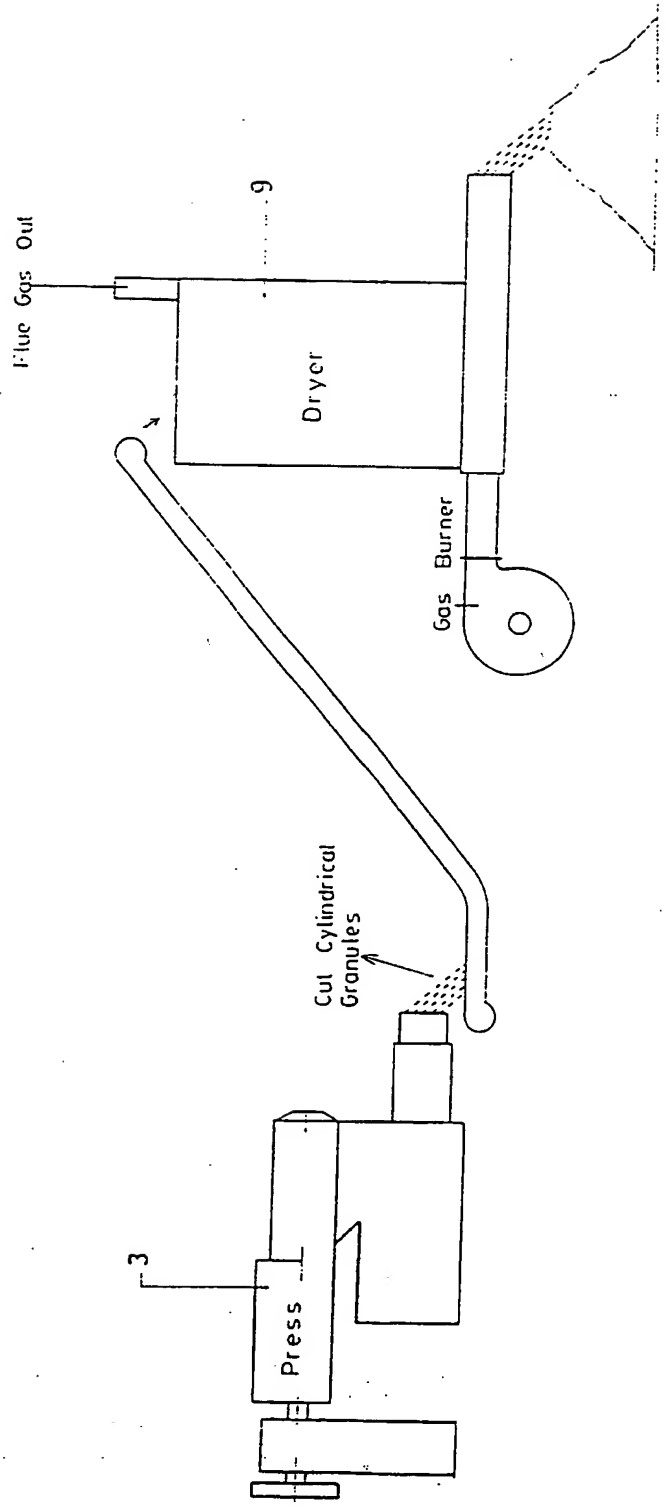
Flue Gas Out
9
Dryer
Gas Burner
Cut Cylindrical Granules
3
Press

Fig. 2

INTERNATIONAL SEARCH REPORT

Int. Jonal Application No
PCT/TR 99/00040

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A01K1/015

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 A01K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
23 May 2000	05/06/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Blas, V

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Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Int ional Application No
PCT/TR 99/00040

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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Form PCT/ISA/210 (continuation of second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

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